

from 64 to 6 n i c.c. respectively. Very different is, however, the bacterial condition of sea-mud, as many as 245,000 microbes being found in 1 c.c. of slime at a depth of 164 feet, and 12,500 at 1,640 feet, whilst sea-water examined at such depths contained 121 and 22 respectively. Russell has been recently extending his observations (*Botanical Gazette*, vol. xvii, 1892) to the sea-water and mud on the Massachusetts coast. The number of bacteria, both in the water and slime, was very much less in these more northern and cooler waters than in the Mediterranean at Naples. The microbes present in the mud from Buzzard's Bay average from 10,000 to 30,000 per c.c., being but a very small fraction of the number found in Mediterranean mud at equal depths. Samples of mud were also obtained about 100 miles from the shore at a depth of 100 fathoms, on the edge of the great continental platform skirted by the Gulf Stream. These samples are the farthest from land that have ever been bacteriologically examined, and bacteria were found in large numbers; moreover, the two prevailing varieties present were identical with those obtained near the Massachusetts coast. As in his earlier researches, Russell also here found but few varieties of bacteria in the mud, mostly two or three, and curiously one form, *Cladotrix intricata*, isolated from Mediterranean mud and frequently met with, was only rarely found in this Atlantic slime.

ETHYL and methyl derivatives of hydroxylamine, in which the alkyl radicles replace an atom of the hydrogen in the amido group, and are therefore directly linked to nitrogen, have been isolated by Dr. Kjellin, of Heidelberg, and their mode of preparation and properties are described in the current number of the *Berichte*. They have been obtained by the decomposition with hydrochloric acid of the esters of meta-nitro-benzaldoxim, which oxim was merely selected on account of its ready preparation in a state of purity. The process consisted in boiling the ester with seven times its volume of concentrated hydrochloric acid in a flask to which a reflux condenser was attached, subsequently cooling, saturating the liquid with hydrochloric acid gas, and again boiling for a few minutes. A large quantity of meta-nitro-benzaldehyde is deposited and removed by filtration, after which the hydrochloride of the substituted hydroxylamine is obtained by evaporation, first over a water bath, and finally over sulphuric acid. In order to isolate the free bases from the hydrochlorides, the same method was adopted as proved so efficacious in the isolation of hydroxylamine itself, namely, decomposition with sodium alcoholate, and subsequent fractional distillation of the resulting liquid *in vacuo*. The hydrochloride was dissolved in the minimum quantity of methyl alcohol, and a little less than the calculated quantity of sodium methylate added, the large evolution of heat being controlled by extraneous cooling. The deposited sodium chloride was removed by filtration through asbestos; filter paper cannot be employed on account of the strongly corrosive properties of these methyl and ethyl derivatives of hydroxylamine. Upon distillation *in vacuo* in the case of the methyl compound, after the greater portion of the methyl alcohol has passed over and at a temperature of 35–40°, an alcoholic solution of the base distils, then finally the free base admixed with a small proportion of alcohol. Upon submitting this last fraction to redistillation, at a temperature of 62° and a pressure of 15 m.m., the pure β -methyl hydroxylamine, $\text{CH}_3\text{NH.OH}$, distils as a colourless liquid, which solidifies to a solid composed of colourless and odourless prisms upon cooling with ice or agitation of the receiver. The crystals melt sharply at 42°, but do not resolidify until the much lower temperature of 20° is reached. Upon distillation *in vacuo* in the case of the ethyl compound, after the methyl alcohol has largely passed over an alcoholic solution of the base distils for a short time, then lastly the ethyl compound itself commences to sublime and condenses in the

receiver in the form of large leafy crystals, filling the whole receiver. After pressing the crystals on porous plates to remove any superficial oil, pure β -ethyl hydroxylamine $\text{C}_2\text{H}_5\text{NH.OH}$ is obtained; the crystals are quite colourless and odourless, and exhibit a mother-of-pearl lustre. They melt sharply at 59–60° without decomposition.

THE β -methyl and β -ethyl derivatives of hydroxylamine are substances which are readily soluble in water and lower alcohols, but only very slightly in ether and benzene. The crystals of both deliquesce in moist air. In the case of the methyl compound the deliquescent substance rapidly volatilises; but in the case of the ethyl compound the deliquescence can only be observed in badly-stoppered bottles, for in the open air the spontaneous volatilisation is so rapid that the substance has not time to deliquesce before it entirely disappears. Both compounds react strongly basic, and reduce alkaline copper and silver solutions as energetically as hydroxylamine itself in the cold. They strongly attack organic substances, but do not etch glass, nor do they appear to be explosive substances like free hydroxylamine. Both compounds are rapidly destroyed by halogens with production of halogen acids; concentrated hydriodic acid converts them to amines. When heated for some time in a sealed tube with concentrated hydrochloric acid, the methyl compound suffers an interesting change, being converted into ammonia and formaldehyde— $\text{CH}_3\text{NH.OH} = \text{NH}_3 + \text{HCOH}$.

NOTES from the Marine Biological Station, Plymouth.—Last week's captures include another living specimen of *Lima Loscombi*, the Holothurian *Thyone fusus*, and the rare Nemerites *Carinella polymorpha* (second specimen), *Cerebratulus marginatus* (first record), and a large *Lineus bilineatus* (16 cm. long). The tow-nettings have been of a uniform character. The diatom *Coscinodiscus* has been present in remarkable profusion for several weeks past. Medusæ have been scarce. The most plentiful larvæ are those of Polychætes, of Cirrhipedes, the *Mysis* stages of several Décapods, and *Scyphonautes*. Veligers are present in small numbers; and isolated specimens of the larvæ of *Cephalothrix*, *Porcellana* and *Carcinus* (*Megalops*) have also been observed. Very few individuals of *Crangon vulgaris* are now to be found bearing ova.

THE additions to the Zoological Society's Gardens during the past week include a Black-handed Spider Monkey (*Ateles geoffroyi*) from Nicaragua, presented by Mr. T. E. M. Rymer-Jones; a Rhesus Monkey (*Macacus rhesus*, ♀) from India, presented by Miss G. A. Gollock; two Macaque Monkeys (*Macacus cynomolgus*, ♂ & ♀) from India, presented respectively by Mr. W. Wyld and the Hon. Mrs. E. Yorke; a Philippine Deer (*Cervus philippinus*, ♀) from Manila, presented by Capt. T. E. Saunders; seven Common Quails (*Coturnix communis*), two Common Terns (*Sterna hirundo*), two Common Toads (*Bufo vulgaris*) European, two Bull Frogs (*Rana catesbeiana*) from North America, a Grey-headed Porphyrio (*Porphyrio poliocephala*) from India, presented by Mrs. Rickards; a Smooth Snake (*Coronella levis*) British, presented by Mr. A. Green; a Bay Wood Owl (*Phodilus bodius*) from Java, deposited; two Rose-Hill Parrakeets (*Platycercus eximius*) from Tasmania, a Purple Sandpiper (*Tringa striata*) British, purchased.

OUR ASTRONOMICAL COLUMN.

A NEW SOUTHERN STAR.—Prof. Krueger has received a telegram from Prof. E. C. Pickering to the effect that a new star was discovered by Mrs. Fleming on October 26. Its Right Ascension is given as 230° 34', and its North Polar Distance = 140° 14'. The magnitude on July 10 = 7.0. No further details have been received, but from the date for which the magnitude is given it is probable that the star was detected by

Mrs. Fleming upon a photographic plate taken in July. The telegram has been communicated to the observatories in the southern hemisphere.

"ASTRONOMICAL JOURNAL" PRIZE.—Owing to the fact that during the past six months only one comet has been discovered, and that its period of visibility was unusually short, and also to the probable prevalence of a bad time of observing weather during the winter, the period specified in the offer of this prize for observation of comets has been extended by six months. The closing time for this prize will now take place September 30, 1894.

COMET BROOKS (OCTOBER 16).—Last week we gave Bidschof's elements and ephemeris for this comet. This week, for the sake of comparison (*Astronomischen Nachrichten*, No. 3194), we give the elements of the comet as obtained from the observations made at Hamburg, October 17; Greenwich, October 18; Pola, October 19; Strassburg, October 23, and Vienna, October 24. They are as follows:—

Elements.

$T = 1893$ September 19²⁰⁹ M.T. Berlin.

$$\begin{aligned} \omega &= 347^{\circ} 20' 50'' \\ \Omega &= 174^{\circ} 53' 20'' \\ i &= 129^{\circ} 45' 77'' \\ \log q &= 9.90992 \end{aligned} \quad 1893.0$$

The current ephemeris is for 12h. Berlin mean time.

1893.		α App.	δ App.	Br.
		h. m. s.		
Nov. 9	...	12 58 50	+30 27.2	0 82
10	...	13 0 53	31 20.6	...
11	...	2 59	32 14.8	...
12	...	5 9	33 9.9	...
13	...	7 22	34 5.8	...
14	...	9 39	35 2.6	0 80
15	...	12 0	36 0.4	...
16	...	13 14 25	36 59.1	...

Unit of brightness occurred on October 17.

MOON PICTURES.—In an article on the "Origin of the Lunar Craters," which has appeared in the last two numbers of *Prometheus* (Nos. 212, 213), the writer has been able to secure some excellent illustrations. These pictures are copies from photographs taken at Paris by the Brothers Paul and Prosper Henry, and illustrate regions near the South Pole. The current number of *Knowledge* also contains two fine reproductions of lunar photographs obtained by MM. Henry, illustrating an article by Mr. A. C. Ranyard, on the tints of the lunar plains.

METEOR SHOWERS DURING NOVEMBER.—During this month, in addition to some minor showers, Mr. Denning's table informs us that there are two which are above the usual brilliancy. The positions of the radiant points are as follows, the two most brilliant being printed in heavier type:—

Date.		Radiant.		Meteors.
		α	δ	
Nov. 13	...	150 +22	...	Swift; streaks
16	...	154 +41	...	Swift; streaks
17	...	53 +71	...	Slowish
20	...	62 +23	...	Slow; bright
27	...	25 +44	...	Very slow; trains
30	...	190 +58	...	Swift; streaks

GEOGRAPHICAL NOTES.

SOME anxiety may have been caused amongst Dr. Nansen's friends by reports published in an evening paper from the slender testimony of some Samoyedes, that the Kara Sea was unusually hampered by ice this season. The *Nouvelles Géographiques*, it is satisfactory to see, reports on the authority of the captains of the Russian vessels carrying railway material to the Yenesei, and of Captain Wiggins, that the navigation of the Kara Sea was particularly easy this summer, the ice being thin and not compact. The Hammerfest whalers also reported that never within human memory has the sea been so free from ice. At the end of December one vessel saw not a single ice-

berg between Nova Zemlya and Franz Josef Land. In the Kara Sea the current, which is usually westerly at that season, was this year running north-north-west, at the rate of a mile an hour. The note indicates that Captain Wiggins entertained no doubt of Dr. Nansen having easily reached the New Siberian Islands, which were to be his real starting-point.

IN continuation of the soundings of the English lakes recorded in this column from time to time during the summer, Mr. E. Heawood, assisted by Mr. Shields, has last week made bathymetrical surveys of Ennerdale, Buttermere, and Crummock Waters.

THE annual report of the Tyneside Geographical Society shows that there is now a membership of 1011, and the society generally in a flourishing state. From its headquarters in Newcastle the Tyneside Society extends its operations over a considerable area, and has established a regular branch in the city of Durham.

DR. JOHN MURRAY, of the *Challenger*, has written an elaborate paper on the first voyage of Columbus in relation to the development of oceanography. It is published in the current number of the *Scottish Geographical Magazine*, illustrated by reproductions of a number of ancient maps. Dr. Murray deals incidentally with the origin of the name America, rejecting Horsford's fantastic guess that it came from the name of the Norse explorer Erik the Red, and inclining towards Marcou's theory of its native origin from the Amerrique tribe of Indians in South America. As to Amerigo Vespucci's connection with the name, the author views it as a playful nickname given to him on account of the similarity of his Christian name, which was superseded by *America*, just as he himself is frequently called "Challenger Murray" for the sake of distinction.

THE EROSION OF ROCK-BASINS.

IN a recent letter to *NATURE* (vol. xlviii. p. 247, July 13, 1893), Sir H. Howorth attacks the views of those extreme glacialists who hold that a glacier is able, by means of the fragments of rock frozen into its under surface, to excavate rock basins: and with justice, so far as the larger basins, such as those of the great Swiss and Italian lakes are concerned, for it has been frequently shown, especially by Prof. Bonney, that such a cause is quite inadequate to account for the excavation of those basins. It seems inconceivable that a glacier which is barely able to move the loose *débris* lying in its path, should be able to plough out hard rocks to any depth whatever below the general valley level. On the other hand, the frequent occurrence of rock basins in regions which are now, or were in former times, subjected to glaciation, is so remarkable, that it appears as though there must be some connection between the two sets of phenomena.

Sir H. Howorth says that, "so far as we know, the mechanical work done by ice is limited to one process. The ice of which glaciers are formed is shod with boulders and with pieces of rock which have fallen down their crevasses. These pieces of rock abrade and polish and scratch the rocky bed in which they lie when they are dragged over it by the moving ice. Without this motion they can of course effect nothing either as burnishers or excavators." But there is another agent of erosion which is only called into play under the peculiar circumstances afforded by glaciers, and one which, I venture to think, is sufficient to account for the formation of these hollows. This is briefly, the action of the water, derived from the melting of the surface of the glacier. It is now some five years since I had the good fortune to be able to explore some of the large glaciers in the higher regions of the Himalayas, and formed the conclusions which I am now about to put forward; but it seemed to me so likely that they had occurred to others, and probably been dismissed as unsatisfactory—though of this I could not assure myself, as it is long since I have had access to any library in which papers relating to such questions might be found—that I hesitated to publish them. It seems, however, from the remark in Sir H. Howorth's letter, quoted above, that no weight has hitherto been attached to this cause of erosion, however slight it may be, and therefore my observations may possibly be of some value.

Before going into details, I wish to draw attention to one or two facts which have been overlooked by Sir H. Howorth, and which have an important bearing on the discussion. In the first place, whatever be the cause of motion, it is an undoubted